



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Seung Mi Jung	Project Number S1611
Project Title A Test of Spectral Predictions of the Bohr Theory	
Abstract Objectives/Goals To determine the success of the Bohr model of the atom predicting the emission spectrum produced by atoms of various elements and to find an empirical value for the Rydberg constant for atoms that the model successfully describes. Methods/Materials A two-arm spectrometer is used to measure the wavelengths of the spectral lines produced by several elements when an electric current is passed through them. A Matlab program is used to generate theoretical values for the brightest spectral lines of each element according to the Bohr Theory. The brightest lines predicted in the visible spectrum are then compared with those observed. For hydrogen, a least squares fit of the observed wavelengths to the Rydberg equation reveals an empirical value of the Rydberg constant. Results The observed wavelengths of the spectral lines of hydrogen are in good agreement with predictions of the Bohr Theory, while those of the other elements tested vary widely from the theoretical values. The value of the Rydberg constant deduced from the hydrogen spectrum is in good agreement with a theoretical value calculated using known constants of nature. Conclusions/Discussion The Bohr model provides an inaccurate or incomplete description of the structure of atoms of elements heavier than hydrogen, and its failure seems to stem from the presence of multiple electrons in these atoms.	
Summary Statement This project is to test the ability of an atomic model to account for the emission spectra of different atoms.	
Help Received Dr. Thomas Kuiper helped me with the development of computer programs. My brother helped me with proofreading and advice on experimental methods. My physics teacher and school helped by providing the spectrometer.	